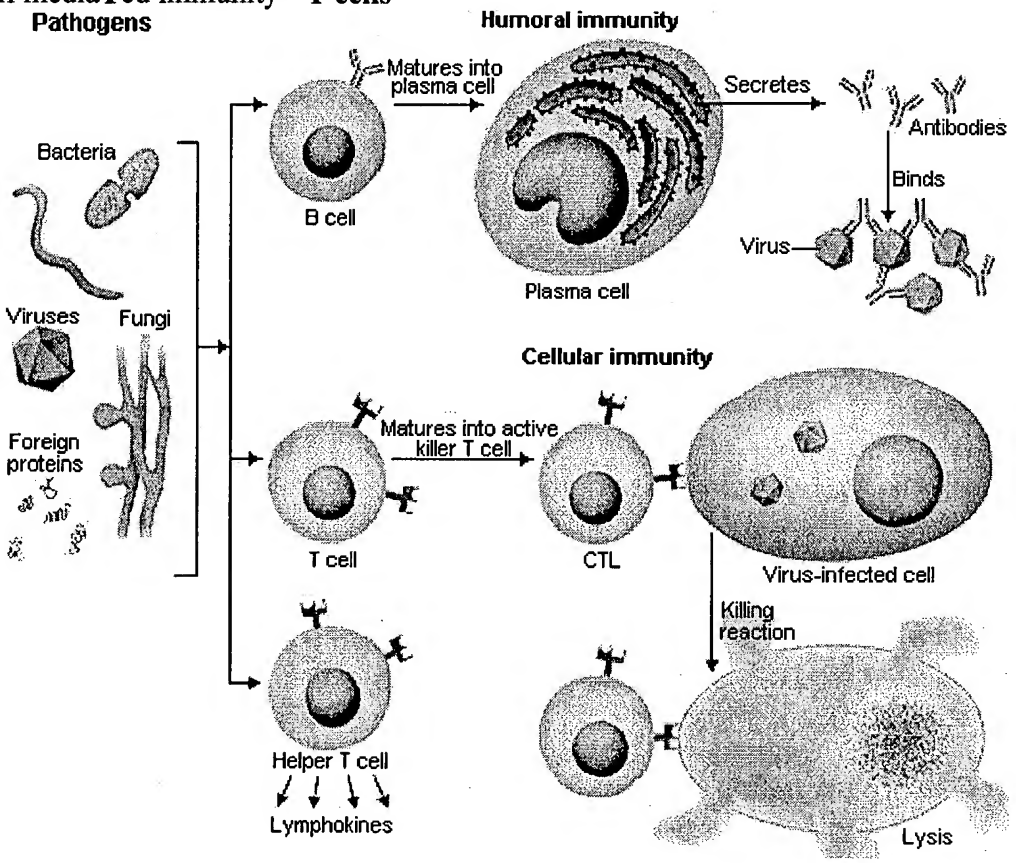
Immune Response System

1. Made up of two cellular systems
   - humoral or circulating antiBody system - **B cells**
   - cell mediaTed immunity - **T cells**

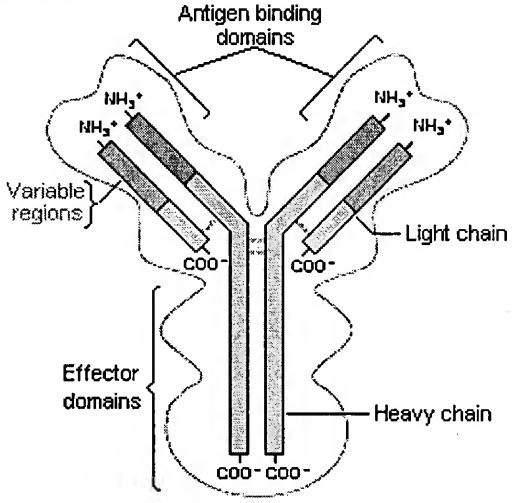


2. Both work by identifying antigens (foreign proteins or polysaccharides) either as part of a virus or bacterium or as a partially degraded byproduct
3. Also recognizes human antigens not made by the individual resulting in graft rejection
4. The humoral antiBody system produces secreted antibodies (proteins) which bind to antigens and identify the antigen complex for destruction. Antibodies act on antigens in the serum and lymph. B-cell produced antibodies may either be attached to B-cell membranes or free in the serum and lymph.
5. The cell mediaTed system acts on antigens appearing on the surface of individual cells. T-cells produce T-cell receptors which recognize specific antigens bound to the antigen presenting

structures on the surface of the presenting cell.

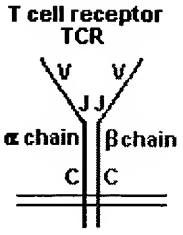
Humoral AntiBody System - B lymphocytes

- each B lymphocyte produces a distinct antibody molecule (immunoglobulin or Ig)
- over a million different B lymphocytes are produced in each individual
- thus, each individual can recognize over a million different antigens
- the antibody molecule is composed of 2 copies of 2 different proteins
  - there are two copies of a heavy chain - over 400 amino acids long
  - there are two copies of a light chain - over 200 amino acids long



- each antibody molecule can bind 2 antigens at one time
- thus, a single antibody molecule can bind to 2 viruses which leads to clumping
- when a new antigen comes into the body
  - it binds to the B-cell which is already making an antibody that matches the antigen
  - the antigen-antibody complex is engulfed into the B-cell and partially digested
  - the antigen is displayed on the cell surface by a special receptor protein (MHC II) for recognition by helper T-cells
  - the B-cell is activated by the helper T-cell to divide and produce secreted antibodies which circulate in the serum and lymph
  - some B-cells become memory cells to produce antibody at a low rate for a long time (long term immunity) and to respond quickly when the antigen is encountered again
  - the **response** is regulated by a class of T-cells called suppressor T-cells

Cell MediaTed System - T lymphocytes



- T-cells mature in the thymus (thus the name T-cell)
- over a million different kinds of T-cells; each producing a different receptor in the cell membrane
- each receptor is composed of 1 molecule each of two different proteins
- each receptor binds a specific antigen but has only one binding site
- receptors only recognize antigens which are "presented" to it within another membrane protein of the MHC type (major histocompatibility complex)
- recognizes antigens presented by B-cells, macrophages, or any other cell type
- T-cells, B-cells, and macrophages use MHC-II receptors for presentation; all other cells use MCH-I (responsible for most of tissue graft rejection)
- when a T-cell is presented with an antigen, its recpetor binds to the antigen and it is stimulated to divide and produce
  - helper T-cells - activate B-cells with bound antigen
  - suppressor T-cells - regulate the overall **response**
  - cytotoxic "killer" T-cells - kill cells with antigen bound in MHC-I

Maintained by Robert J. Huskey
last updated December 4, 1998.

PRESS RELEASE ARCHIVE

Coley Pharmaceutical Group Granted Broad Patent for Use of Oligonucleotides to Stimulate Immune Response
Patent covers drugs for cancers, infectious diseases and vaccines

Wellesley, MA - April 27, 2004

Coley Pharmaceutical Group today announced that the U.S. Patent and Trademark Office has issued U.S. Patent 6,727,230 titled "**Immune** Stimulation by Phosphorothioate Oligonucleotide Analogs". The patent broadly protects the use of oligonucleotides containing at least one phosphorothioate linkage to stimulate cellular **Immune** responses. The patent covers a wide range of immunostimulatory oligonucleotides, including, but not limited to, CpG TLR9 agonists, the basis of Coley's lead products ProMune™ and Actilon™. The patent covers such molecules in a wide range of applications for **Immune** stimulation, including treatment and prevention of cancer and infectious diseases, both as monotherapy and in combination with other therapies.

"This patent further expands Coley's dominant position in the field of **Immune** stimulatory oligonucleotides," commented Robert L. Bratzler, Ph.D., Coley President and Chief Executive Officer.

The technology covered in patent 6,727,230 is part of the patent estate acquired by Coley from Isis Pharmaceuticals in 2000. To date, Coley has been granted twelve U.S. Patents covering immunostimulatory oligonucleotides and CpG TLR9 agonists. Coley has more than 85 additional patent applications pending in the U.S. and abroad.

About Coley Pharmaceutical Group
Coley Pharmaceutical Group is an international biopharmaceutical company that discovers, develops and commercializes TLR Therapeutics™, a new class of drugs that direct the human **immune** system to treat cancers, viral diseases, asthma and allergy. Coley has four products in clinical stage development targeting major disease indications including cancer (non-small cell lung cancer, malignant melanoma, and cutaneous T-cell lymphoma), chronic hepatitis C (HCV), and asthma and allergy. Coley has partnered programs with Aventis, GlaxoSmithKline, Chiron Corporation and the US Government. Coley is headquartered in Wellesley, Massachusetts, USA, and has research and development laboratories in Langenfeld, Germany and Ottawa, Canada. For further information, please visit www.coleypharma.com.

IMMUNE RESPONSE: Dictionary Entry and Meanin

Matching Terms: **Immune response** gene

WordNet Dictionary

Definition: [n] a bodily defense reaction that recognizes an invading substance (an antigen: such as a virus or fungus or bacteria organ) and produces antibodies specific against that antigen

Synonyms: **immune** reaction, immunologic **response**

See Also: anamnestic reaction, anamnestic **response**, cell-mediated **Immune response**, complement, complement fixation, hun **response**, reaction, **response**

Medical Dictionary

Definition: The activity of the **immune** system against foreign substances (antigens).

Biology Dictionary

Definition: The reaction of the body as a whole (not just the **Immune** system, as in an **immune** reaction) to the presence of an ar includes making antibodies, developing immunity, developing hypersensitivity to the antigen, and developing tolerance.

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Suppression of Different Phases of Systemic Contact Hypersensitivity by Urocanic Acid Oxidation Products

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ABSTRACT

ABSTRACT Upon exposure to UVB, the epidermal component trans-urocanic acid is not only photoisomerized into cis-urocanic acid, but will also, at least in part, be photooxidized into urocanic

acid oxidation products. We hypothesized that urocanic acid oxidation products can mimic UV-induced systemic immunosuppression comparable to the suppressive properties already established for cis-urocanic acid. A crude mixture of urocanic acid oxidation products showed a significant suppression of the sensitization phase of the systemic contact hypersensitivity response to picryl chloride. Three of the urocanic acid oxidation products were selected for this study: imidazole-4-carboxylic acid, imidazole-4-carboxaldehyde and imidazole-4-acetic acid. Effects on the sensitization-, elicitation- and post-elicitation phase of contact hypersensitivity to picryl chloride in BALB/c mice were studied and compared to the effects of cis-urocanic acid. Imidazole-4- carboxaldehyde was equally effective at suppressing the sensitization phase as cis-urocanic acid. The triplet combination of the imidazoles showed more pronounced suppression than that induced by cis-urocanic acid. The most effective compounds for the suppression of the elicitation phase appeared to be imidazole-4-acetic acid and cis-urocanic acid. Significant suppression of the post-elicitation phase was only obtained with the triplet combination of imidazole-4-carboxaldehyde, imidazole-4-carboxylic acid and imidazole-4-acetic acid, which combination appeared to be effective at all three tested phases. Because these three urocanic acid oxidation products are present in UVB-exposed human stratum corneum, these compounds may play a role in UVB-induced immunosuppression.

Key words: cis-urocanic acid, imidazoles, ultraviolet radiation, contact allergy, immunosuppression

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